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10/562,718	06/02/2006	Abbas Razavi	F-873 (31223.00103)	8618
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/562,718  
Filing Date: June 02, 2006  
Appellant(s): RAZAVI, ABBAS

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Tenley R. Krueger  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed July 30, 2007 appealing from the Office action mailed March 3, 2007.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,143,683	Shamshoum et al.	11-2000
*4,892,851	Ewen et al.	1-1990
6,646,051	Demain	11-2003

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WO 00/60148

Demain

10-2002

EP 1 138 687

Kawai et al.

04-2001

\*Ewen et al. is incorporated by reference in Shamshoum et al.

### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

(I) Claims 12-17 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shamshoum et al. (US 6,143,683) in view of Kawai et al. (EP 1 138 687).

Shamshoum teaches a process for the preparation of isotactic and syndiotactic polypropylene blend by polymerization propylene in the presence of a catalyst composition prepared by supporting an isotactic metallocene catalyst and a syndiotactic metallocene catalyst on a common support (col. 2, lines 50-59; col. 4, lines 15-29; col. 5, lines 25-67; and Examples 5 and 12). Examples 5 and 12 demonstrate an isotactic and syndiotactic polypropylene blend containing 90% of isotactic polypropylene with a polydispersity of 2.7 (polydispersity= $M_w/M_n=160/60=2.7$ , see Table II in col. 12). The low value of polydispersity of 2.7 indicates a single composite peak. Therefore, Shamshoum's polypropylene blend meets the limitation of the instant claims.

Shamshoum discloses that the preferred syndiotactic metallocene components include those disclosed in Ewen et al. (US 4,892,851) which are incorporated therein by reference (col. 5, lines 64-67). Since isopropyl(fluorenyl)-(cyclopentadienyl) hafnium dichloride and isopropyl(fluorenyl)(cyclopentadienyl) zirconium dichloride are the only two metallocene complexes exemplified in Ewen et al. (see US 4,892,851: col. 9,

Example 1 and col. 11, Example 3), one must conclude that Shamshoum's syndiotactic metallocene complexes include isopropyl(fluorenyl)(cyclopentadienyl) hafnium dichloride and isopropyl(fluorenyl)(cyclopentadienyl) zirconium dichloride, each complex respectively containing a cyclopentadienyl ring and a fluorenyl ring. It is noted that Shamshoum does not expressly teach the isotactic metallocene catalyst to be the metallocene containing a bridged cyclopentadienyl and fluorenyl ligand of the instant claims. However, using a metallocene containing a bridged cyclopentadienyl and fluorenyl ligand to prepare isotactic propylene polymers is conventional in the art and such is disclosed in Kawai (Abstract, [0214]-[0222], and Examples 47-126).

Shamshoum and Kawai are analogous because they both are from the same area of endeavor of metallocene catalyst composition for olefin polymerizations.

Thus, it would have been obvious to a skilled artisan at the time the invention was made to employ Kawai's isotactic metallocene catalyst in Shamshoum's polymerization process in search for a catalyst composition with increased activity and/or provide olefin polymers with better tailored stereoregularities and molecular weights and in the absence of any showing of criticality and unexpected results.

(II) Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shamshoum et al. (US 6,143,683) in view of Kawai et al. (EP 1 138 687) and further in view of Demain (WO 00/60148, its US family US 6,646,051 is referred to for convenience hereinafter).

The combined teaching of Shamshoum and Kawai is relied upon as shown above.

It is noted that Shamshoum does not expressly demonstrate the process of extruding a fiber from the blend. However, extruding a fiber from the isotactic and syndiotactic polypropylene blend is well known in the art and is acknowledged in Shamshoum (col. 2, lines 3-5 and 27-29) and such is also taught in Demain. Therefore, it would have been obvious to a skilled artisan at the time the invention was made to extrude Shamshoum's blend to provide a fiber with improved mechanical properties and in the absence of any showing criticality and unexpected results.

It is also noted that Shamshoum does not expressly teach the preparations of the isotactic and syndiotactic polypropylenes in separate reaction zones and then blending them together to provide the polypropylene blend. However, such a process is conventionally practiced in the art in order to better control properties such as molecular weight, molecular distribution and proportion of the individual polymer component in the blend. For example, Demain's isotactic and syndiotactic polypropylenes are prepared separately and then blended together to provide the blend. Therefore, it would have been obvious to a skilled artisan at the time the invention was made to modify Shamshoum's process to prepare the isotactic and syndiotactic polypropylenes in separate reaction zones for the benefits cited above and in the absence of any showing criticality and unexpected results.

#### **(10) Response to Argument**

(i) Appellants assert that Shamshoum does not teach the syndiospecific metallocene component recited in the appealed claims. In particular, the syndiospecific catalyst of Shamshoum does not include a cyclopentadienyl ring and a fluorenyl ring.

On the contrary, Shamshoum discloses that the preferred syndiotactic metallocene components include those disclosed in Ewen et al. (US 4,892,851) which are incorporated therein by reference (col. 5, lines 64-67). Since isopropyl(fluorenyl)-(cyclopentadienyl) hafnium dichloride and isopropyl(fluorenyl)(cyclopentadienyl) zirconium dichloride are the only two metallocene complexes exemplified in Ewen et al. (col. 9, Example 1 and col. 11, Example 3), one must conclude that Shamshoum's syndiotactic metallocene complexes include isopropyl(fluorenyl)(cyclopentadienyl) hafnium dichloride and isopropyl(fluorenyl)(cyclopentadienyl) zirconium dichloride, each complex respectively containing a cyclopentadienyl ring and a fluorenyl ring.

(ii) Appellants argue that Shamshoum teaches that linear substituents are preferred and does not adequately set forth the teaching of fluorenyl ligands. Again, this is incorrect. Shamshoum teaches that the Cp in  $R''(CpR_n)(CpR'_m)MQ_k$  to be a cyclopentadienyl or substituted cyclopentadienyl (col. 6, lines 1-5), clearly, the preferred "linear substituent" R or R' is not part of the substituted cyclopentadienyl, they are the substituents on the substituted cyclopentadienyl. In view of the disclosure regarding the structure of  $R''(CpR_n)(CpR'_m)MQ_k$  disclosed in Ewen which is incorporated by Shamshoum, the substituted cyclopentadienyl "Cp" actually represent ligand such as fluorenyl ring because  $R''(CpR_n)(CpR'_m)MQ_k$  is exemplified in Ewen as isopropyl(fluorenyl)(cyclopentadienyl) hafnium dichloride and isopropyl(fluorenyl)(cyclopentadienyl) zirconium dichloride.

Appellant secondly argue that the present claims recite a unimodal product while Shamshoum results in multimodal product, and col. 12, lines 38-42 and Figure 3 are

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cited for support. Based on the data of Shamshoum's working examples 8-14 listed in Table II of col.12, the analysis of the data is disclosed in lines 38-42 of col. 12 as the following:

35 As shown in FIG. 2, the hydrogen responses of both sPP  
and iPP catalyst were significantly different; thus, the MFR  
of reactor blend were varied depending on the catalyst  
employed for blend preparation. The higher the amounts of  
sPP, the lower the MFR of reactor blend. These results  
40 suggest that a BMWD could be produced if the hydrogen  
response of the two catalysts are significantly different.

That is, the data listed in Table II of col. 12 of working examples 8-14 show that the higher percentage of syndiotacticity catalyst component in the catalyst composition, the lower the melt flow rate of the polymer blend; therefore, the data suggest a bimodal molecular weight distribution (BMWD) could be produced if the hydrogen response of the two catalyst are significantly different. Apparently, Shamshoum's disclosure here implies that working examples 8-14 are unimodal, however polypropylene with BMWD could possibly be produce with different catalyst composition wherein the hydrogen response of the two catalyst are significantly different. Furthermore, a skilled artisan would have conclude that polypropylene with unimodal molecular weight distributions are produced in working examples 8-14 based on the narrow polydispersities of Mw/Mn of less than 3 calculated from Table II.

As for Shamshoum's Fig. 3, Fig. 3A shows the melting and crystallization temperatures of a syndiotactic polypropylene, and Fig. 3B, shows the melting and crystallization temperatures of a polypropylene blend of 10% of isotactic polypropylene and 90% of syndiotactic polypropylene. Those figures do not provide any information regarding molecular weights let alone the molecular weight distribution.



(iii) Appellant argues that there is no motivation to replace Shamshoum's indenyl ligand containing metallocene catalyst component with Kawai's fluorenyl ligand containing metallocene catalyst component for making the isotactic polymer in the polymer blend.

Shamshoum's indenyl ligand containing metallocene and Kawai's fluorenyl ligand containing metallocene are functionally equivalent in that both metallocene complexes are for making isotactic polypropylene, therefore, one of ordinary skill in the art would have recognized when Shamshoum's indenyl ligand containing metallocene is replaced with Kawai's fluorenyl ligand containing metallocene, the catalyst composition would be expected to provide a polypropylene blend. Further, when both isotactic catalyst and syndiotactic catalyst contain fluorenyl ligands, they are more compatible with each other due to the structural similarities and are more likely to be uniformly supported and, thus, provide more uniform polymer blend.

Appellant further asserts that replacing Shamshoum's indenyl ligand containing metallocene catalyst component with Kawai's fluorenyl ligand containing metallocene catalyst component would render the catalyst of Shamshoum inoperable because Shamshoum's bimetallic catalyst system produces propylene polymers with BIMWD. However, such an assertion is not supported by Shamshoum. As shown earlier, Shamshoum demonstrates the preparation of polypropylene blend with unimodal molecular weight distribution in at least working examples 8-14, that is, preparation of polypropylene blend with unimodal molecular weight distribution is Shamshoum's preferred embodiment.

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In view of the foregoing, the rejection (I) is deemed proper and for the same token rejection (II) is also deemed proper.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Caixia Lu, Ph.D.  
Primary Examiner



Conferees:



David Wu  
Supervisory Examiner



Romulo Delmendo, Appeals Specialist